# DEVELOPMENT, GROWTH, AND STATE OF THE ATOMIC ENERGY INDUSTRY

THE UNIVERSITY OF MICHIGAN

JAN 5 1960

MAIN READING ROOM

INDEX TO

# HEARINGS

BEFORE THE

# JOINT COMMITTEE ON ATOMIC ENERGY

## CONGRESS OF THE UNITED STATES

EIGHTY-SIXTH CONGRESS

FIRST SESSION

ON

DEVELOPMENT, GROWTH, AND STATE OF THE ATOMIC ENERGY INDUSTRY

---

1959

---

**Pursuant to Section 202 of the Atomic Energy Act of 1954**

---

HELD ON FEBRUARY 17, 18, 19, 24, 25, AND 26, 1959

---

Printed for the use of the Joint Committee on Atomic Energy

UNITED STATES
GOVERNMENT PRINTING OFFICE
48501 WASHINGTON : 1959

## JOINT COMMITTEE ON ATOMIC ENERGY

CLINTON P. ANDERSON, New Mexico, *Chairman*
CARL T. DURHAM, North Carolina, *Vice Chairman*

| | |
|---|---|
| RICHARD B. RUSSELL, Georgia | CHET HOLIFIELD, California |
| JOHN O. PASTORE, Rhode Island | MELVIN PRICE, Illinois |
| ALBERT GORE, Tennessee | WAYNE N. ASPINALL, Colorado |
| HENRY M. JACKSON, Washington | ALBERT THOMAS, Texas |
| BOURKE B. HICKENLOOPER, Iowa | JAMES E. VAN ZANDT, Pennsylvania |
| HENRY DWORSHAK, Idaho | CRAIG HOSMER, California |
| GEORGE D. AIKEN, Vermont | WILLIAM H. BATES, Massachusetts |
| WALLACE F. BENNETT, Utah | JACK WESTLAND, Washington |

JAMES T. RAMEY, *Executive Director*
GEORGE F. MURPHY, JR., *Professional Staff Member*

DEPOSITED BY THE
ED STATES OF AM

# INDEX TO 1959 HEARINGS ON DEVELOPMENT, GROWTH, AND STATE OF THE ATOMIC ENERGY INDUSTRY [1]

Hearing dates: Page
Tuesday, February 17, 1959 1
Wednesday, February 18, 1959 53
Thursday, February 19, 1959 113
Tuesday, February 24, 1959 193
Wednesday, February 25, 1959 265
Thursday, February 26, 1959 331

A

Access permit program 7–8, 339, 434, 559, 598, 600, 603–604
ACF Industries. (*See* Kaiser Engineers.)
Adequacy of present power reactor development program. (*See* Power reactor development, adequacy of.)
Agreements for cooperation. (*See* Bilateral agreements.)
Air-pollution monitor 168
Aircraft, nuclear-powered. (*See* Propulsion, nuclear, aircraft.)
Alco Products, Inc 246–249
Allis-Chalmers Manufacturing Co 443
Aluminum alloys 496
American & Foreign Power Co 9, 33
American Electric Power Service Corp 239–240, 367
American Federation of Labor and Congress of Industrial Organizations 280–284, 285–289
American Metal Markets, article, January 15, 1959 211
American Public Power Association 142, 143, 150–152, 157, 625
American Radiator & Standard Sanitary Corp. 194, 201–202, 205–206, 209–210
Anderson, Clinton P., chairman, Joint Committee on Atomic Energy, statement of 2–4
Anderson-Price Act 333, 340–341, 342–344, 470, 540
Applied research. (*See* Atomic Energy Commission, Research and development.) 510
Aqueous homogeneous reactor 66, 74, 111, 196–197, 198, 315, 348–366, 431, 487, 501–502, 511, 521, 527, 533
Argonne National Laboratory 15, 67, 68, 87, 88, 89, 98, 194, 202, 220, 221, 463, 488, 496, 498, 606
Armocer Research Foundation 34
Atomic Energy Act of 1954 3
Atomic Energy Commission (*see also* Power reactor development; Power reactor demonstration program):
Attitude toward rural electric cooperatives 335
Budget 2, 77, 78, 82–83, 99, 102–103, 106–107, 486, 493–494, 502
Construction program 48, 75, 77, 84–85, 99, 104, 294, 426
Contract policies 6–7, 18, 31–33, 34, 37, 210–212, 213–216, 334–335, 415–419, 453, 482
Decentralization 6, 36
Expenditures, power reactors 80
Fuel element, lease or sell 10
License practices. (*See* Licensing.)
Patent policy. (*See* Patents.)
Personnel problems 544–545
Power reactors 9, 84–85, 87–88, 102–103, 106–107, 383–384, 440, 547
Number 87–88
Chart 84–85

[1] The Joint Committee on Atomic Energy wishes to acknowledge the assistance of Mrs. Erin W. Nisbet, Economics Division, Legislative Reference Service, Library of Congress, in the preparation of this index.

Page
Atomic Energy Commission—Continued
Procurement policies ..... 8, 18–19, 32–33, 404–406, 408, 409, 410, 422, 474
Research and development ..... 31–33, 510, 520, 530–531
Atomic energy products, 1957, chart ..... 629
Atomic Energy of Canada, Ltd ..... 302–303
Atomic Industrial Forum, Inc ..... 82, 224, 459, 533, 549–562
Atomic power. (*See* Power, nuclear.)
Atomic Power Development Associates, Inc. (APDA) ..... 393
Atomics International ..... 34, 391
Atoms for peace program (*see also* Bilateral agreements, International Atomic Energy Agency) ..... 15, 288, 449, 452
Auchinloss, Samuel S., president of Tracerlab, Inc ..... 175, 629
Statement ..... 167–174

B

Babcock & Wilcox Co., statement of ..... 428–430
Baldwin-Lima-Hamilton Corp ..... 317
Baltimore Gas & Electric Co ..... 350
Basic research. (*See* Atomic Energy Commission; Research and Development.)
Battelle Memorial Institute ..... 34, 607
Batteries, nuclear ..... 323
Beamer, R. W., executive secretary, Wyoming Mining Association, letter from, to Chairman Anderson, February 23, 1959 ..... 483
Bechtel Corp ..... 71, 135, 186, 393
Belgium ..... 10, 281
Bell Aircraft ..... 106
Benedict, Dr. Manson ..... 437
Beryllium, nuclear power moderator ..... 377
Bettis plant, operated by Westinghouse ..... 216, 219, 220, 476
Bhabha, Dr ..... 254
Bilateral agreements ..... 11, 16, 20, 434, 543, 559
List of ..... 559
Boiling water reactors ..... 15, 56–58, 69, 87, 91–93, 194, 196, 201–202, 205–207, 208, 305, 373, 431, 487, 490, 498–499, 510, 532, 533, 548
Bonneville Power Administration ..... 286
Boron ..... 10
Brazil ..... 9, 147
Bremsstrahlung generator ..... 267
Brightsen, R. A., president, Nuclear Science & Engineering Corp., statement of ..... 458–460
Brookhaven medical reactor ..... 35
Broron Boveri Co ..... 8
Burlington, Vt ..... 156
Busby, Jack, Westinghouse Electric Corp., statement ..... 348–359

C

Calder Hall powerplant (Great Britain) ..... 33, 118, 121, 140, 141, 427, 626
Canada ..... 8, 58–59, 74, 171–172, 211, 281, 302, 303, 304, 400, 406–407, 408, 409–413, 423, 425, 524, 579
Canadian Metal Mining Association ..... 406–407, 408–412
Submitted statement ..... 409–412
Carolina Power & Light Co ..... 433
Carolinas-Virginia Nuclear Power Associates ..... 60, 74, 88, 100, 108, 376, 393, 433–492
Submitted statement ..... 433
Central Utilities Atomic Power Associates ..... 393
Chalk River research reactor, Canada ..... 218
Chamber of Commerce of United States, submited policy statement ..... 434–436
Chicago, Ill., city of ..... 36
Chicago Midway Laboratories ..... 34
Chrysler Corp ..... 106
Chugach-Electric Association, Inc., Anchorage powerplant ..... 41, 76, 86, 88, 100, 101, 102, 145, 258, 290, 294–295, 296–300, 489, 491, 526

Page
Churchill, Hon. Gordon, Minister of Trade and Commerce, Canada, statement of ---- 412–413
Cisler, Walter, president, Detroit Edison Co ---- 259
Cities Service Oil Co., submitted statement ---- 436–437
Classification and declassification, information (*see also* Access permit program) ---- 7, 27, 138–139, 187, 212–213, 327, 334, 336–337, 338–340, 406, 434, 481–482, 559, 599, 601, 603
Clearances. (*See* Access permit program.)
Coal. (*See* Fuel, conventional.)
Cockcroft, Sir John ---- 94
Cocke, N. A., president, Carolinas-Virginia Water Power Associates, Inc ---- 287
Combustion Engineering, Inc ---- 9, 302, 367
Commonwealth Associates, Inc ---- 438–439
Commonwealth Edison Co. (*See also* Dresden, Ill., powerplant) ---- 176, 311, 393, 493
Consolidated-Edison Co., of New York, Inc ---- 55, 87, 274–279, 393, 429, 493
Indian Point powerplant ---- 55, 87, 276–278, 372, 393, 429, 493, 564, 565, 567, 569–570, 573, 577, 582, 591, 592
Consumers Public Power District of Nebraska (*see also* Hallan nuclear power facility) ---- 43, 65, 71, 76–77, 101, 145, 155, 156, 157, 290
Consumers Power Co., Mich ---- 196
Cuba ---- 9, 549
Costs. (*See* Power, nuclear; *see also* Individual power reactors.)
Curtis-Wright Corp ---- 34, 557
Czechoslovakia ---- 191

D

Davenport, Dr. Lee L., president, Sylvania-Corning Nuclear Corp., statement ---- 470–474
Davis, W. Kenneth, vice president Bechtel Corp., statement ---- 176–190
Dawn Mining Co ---- 413–416, 417
Daystrom ---- 106
Dayton, R. W ---- 607
Declassification. (*See Classification and Declassification.*)
Defense Department ---- 9
Demonstration program, Atomic Energy Commission. (*See* Power reactor demonstration program; Isotopes.)
Denver & Rio Grand Western Railroad ---- 317–323
Detroit Edison Co ---- 259, 283, 393, 442–444, 461
Statement ---- 442–444
Dow Chemical Co ---- 106
Dresden, Ill., powerplant ---- 87, 176, 335, 341, 373, 393, 439–440, 493, 564, 565, 567, 569–570, 573, 577, 582, 591
Duckworth, M ---- 94
Duke Power Co ---- 433
Du Pont (E. I.) de Nemours & Co., Inc ---- 302
Duquesne Light Co ---- 224, 227, 308–309, 391
Durham, Hon. Carl T ---- 2–3

E

East Central Nuclear Groups, Inc., (ECNG) ---- 63, 239–241, 376, 395, 492
Edison-Volta. (*See* Westinghouse.)
Edison Electric Institute ---- 286–287, 380, 396, 546, 563–597
Survey and power reactor costs ---- 563–597
Eldorado Mining & Refining, Ltd ---- 211, 409, 410, 412–413
Electric utilities companies participation in nuclear power development ---- 380–381, 386–396
Expenditures, total, list ---- 393
Plants in operation ---- 392–393
Plants under construction ---- 392–393
Plants being planned ---- 394–395

Elk River, Minn., powerplant. (*See* Rural Cooperative Power Association.)
Ellis, Clyde T., general manager, National Rural Electric Cooperative Association, statement of ---- Page 251–263
Emelyanov, Professor, Atomic Energy Authority, Soviet Union ---- 14
Emerson Radio & Phonograph Co ---- 34
Engineering and Mining Journal, article, February 1959 ---- 210–211, 213, 214
Enrico Fermi nuclear powerplant, Monroe, Mich ---- 67, 74, 88, 89, 98, 438, 443–444, 465–466, 564, 565, 567, 569–570, 571, 572, 573, 576, 579, 580, 582, 597.
Cost of nonnuclear facilities ---- 443
Estimated overall cost summary ---- 466
Esso Shipping Co ---- 230–239
Eureka, Calif ---- 393
Europe (*see also* Individual countries) ---- 126, 302–303, 305, 311, 333, 340, 343, 345, 515–516, 544
European Atomic Energy Community (Euratom) ---- 11, 16, 20–21, 59, 281, 289, 302, 305, 310–312, 333, 337, 341, 430, 431, 452, 453, 511, 531, 534, 536, 537, 540, 543, 544.
Explosives, nuclear (*see also* Project Plowshare) ---- 13

F

Fairman, James F., senior vice president, Consolidated Edison Co., statement of ---- 274–279
Far East. (*See* South Asia.)
Fast-breeder reactor. (*See* Power reactor; Types of.)
Financing. (*See* Power reactor development; Power reactor demonstration program.)
Fissionable material. (*See* Plutonium, Uranium 233, Uranium 235.)
Florida West Coast Nuclear Group (FWCNG) ---- 63, 100, 136, 239–241, 492, 511, 526, 527
Fluor, J. S., president, the Fluor Corp., Ltd., letter from, to George F. Murphy, February 9, 1959 ---- 446–447
Fluor Corp., Ltd ---- 446–447
Ford Instrument Co ---- 114, 115, 116, 117
Foreign Activities. (*See* Atoms for Peace; Power reactor development; Power reactors.)
Foote, J. H., chief engineer, Commonwealth Associates, Inc., letter from, to Chairman Anderson, February 13, 1959 ---- 438–439
Fort Greely, Alaska ---- 246
Forum Memo, article ---- 533, 546–548
Fossil fuel. (*See* Fuel, conventional.)
Foster, George B., Industrial Nucleonics, statement of ---- 265–274
Foster, Paul, Deputy General Manager, Atomic Energy Commission ---- 99
letter from, to James T. Ramey, March 10, 1959 ---- 175
Foster Wheeler Corp ---- 106, 194
France ---- 96, 143, 425
Fuel, conventional ---- 3, 14, 39, 98–99, 151, 159, 160–162, 164, 166, 240, 242–245, 255, 318–321, 327–330, 382, 398, 400–403, 432, 435, 444, 510, 513, 514, 519.
Coal ---- 161, 164, 318–320, 321, 327–330, 398, 400–401, 403
Oil ---- 159, 160–161, 164
Fuel element, nuclear ---- 37, 123, 518, 566–567
Burnup effects and costs ---- 37, 518, 519, 574–580
Ceramic ---- 141, 468, 469
Cost of ---- 121, 495–496, 516–519, 536, 568–597
Chart ---- 495
Core fabrication ---- 219, 495, 510, 517, 519, 520–521, 530, 532, 536, 558
cost of ---- 496, 573, 583, 585, 587, 589, 593–4

Fuel element, nuclear—Continued Page
Fuel cycle development 447, 455–456, 493–496, 567
1959 funds 493–494
Lease by AEC and selling of 10, 155, 277, 437, 536, 586–587
Pellets 116, 119, 123, 217–220, 496, 583, 585, 588, 594
Processing of spent reactor fuels 277–278, 334, 339, 437–438, 474, 520–521, 558, 581, 592–597
Charges for 437–438
Research and development of 67, 494–496, 530
Waste disposal problems 321, 322, 326, 530, 558

G

Gainesville, Fla 76
Gale, Willis, chairman, Commonwealth Edison Co., statement of 439–441
Gamma radiation 9, 442, 557
Gamble, M. G., engineer, Esso Shipping Co., letter from, to Clarence G. Morse, Administrator, U.S. Maritime Administration, Feb. 7, 1958 230–231
Gammill, Dr. Adrian, director, Rare Earths and Thorium Division of Michigan Chemical Corp., testimony 165–166
Gas-cooled reactors. (*See* Power reactors, types of.)
General Dynamics Corp 63, 100, 101, 118, 119, 124–134, 135, 136–137, 139, 140–141, 185, 186, 291, 372–373
HTGR (high-temperature gas reactor) program 135, 136, 395
MGCR program (maritime gas-cooled reactor) 119, 124–134, 135, 138, 139
TRIGA program 136–137
General Electric Co 18, 29, 87, 157, 176, 302, 311, 332, 333, 335–336, 391, 393, 548
Statement 331–347
General electric Co. and Pacific Gas & Eleciric Co., Valleceto, Calif., powerplant 87, 335, 336, 391, 493, 499
General Nuclear Engineering Corp 9, 239–240, 433, 605
General Public Utilities Corp 109, 395, 447–449, 486
Germany, Federal Republic of 10, 96, 142, 336, 400, 594
Gilbert Associates, Inc 395, 448
Grahl, James L., director, atomic energy service, American Public Power Association, statement of 155–156
Letter from, to Hon. Chet Holifield, Jan. 26, 1959 625–628
Letter from, to Hon. Chet Holifield, Feb. 25, 1959 143
Gravgaard, O. N., president, Rural Cooperative Power Association, letter from, to Chairman Anderson, Feb. 16, 1959 467–468
Great Britain. (*See* United Kingdom.)
Gunther, John 254

H

Hallam (Nebr.) Nuclear Power Facility 41, 65, 70–73, 83, 88, 97, 98, 101, 102, 158, 176, 441–442, 489
*See also* Consumers Public Power District of Nebraska, chart 73
Hanford, Wash., power reactor 74, 89, 157, 286, 376, 427, 540, 542
Heavy water 10, 302, 334, 339, 423, 437, 626
Helium 63, 376
Heller, Edward L., director, nuclear division, H. K. Ferguson Co., Inc., letter from, to James T. Ramey, March 13, 1959 449
Hersey, Mich., power project. (*See* Wolverine Electric Cooperative.)
High Temperature Reactor Development Associates 135, 395
Hinkley Point powerplant, Great Britain 143
H. K. Ferguson Co., Inc., statement of 449–451
Holyoke, Mass:
City of, gas and electric department, statement of 451–452
Power reactor project 76, 117, 119–120, 145, 185, 186–187, 451–452
Humboldt Bay powerplant, Eureka, Calif. (*See* Pacific Gas & Electric Co.)

I

Idaho chemical processing plant 176
India 146, 147, 254, 423

Page
Indian Point powerplant. (*See* Consolidated Edison Co. of New York, Inc.)
Industrial Nucleonics Co ..... 265–274
Industry (*see also* Power reactor development; Power reactor demonstration program; Isotopes) ..... 3, 9, 10, 19, 106, 146–150, 151–152, 385, 486
Information (*see also* access permit program):
Control of (*see also* Classification and declassification exchange of ..... 13, 337, 511, 536, 537
Technical information program of AEC ..... 598–625
Insurance, third-party liability. (*See* Patents.)
International activities. (*See* Atoms for peace program.)
International Agency for the Peaceful Uses of Atomic Energy ..... 16–18, 20, 21
International Association of Industrial Accident Boards & Commissions .. 282, 288
International Atomic Energy Agency (IAEA) ..... 11–12, 16–18, 20–21, 69, 281, 283, 284, 289, 434, 511, 536, 537, 543
International Bank for Reconstruction and Development ..... 549
International Confederation of Free Trade Unions ..... 284
International Labor Organization ..... 281
Isbrandtsen Co ..... 114, 115, 117, 122, 238
Isotopes ..... 13–14, 15–16, 34, 35, 36, 137, 163, 167, 169, 171–175, 266–274, 318, 321, 322–323, 329–330, 457, 458, 549, 557, 560–562, 629
Agricultural use of ..... 34, 270, 322–323, 549, 557
Cobalt ..... 318, 321, 549, 557
Increase use of ..... 13, 137, 167–175, 266–267, 272–273, 457–458
Industrial use of ..... 13, 137, 265–272, 329–330, 457–458, 549, 557, 560–562, 629
Instruments ..... 136–137, 457, 629
Licensing of ..... 12, 13, 167, 272, 273, 325, 330, 557
Medical use of ..... 34, 35–36, 137, 172
Need for basic research ..... 458
Training program for use of ..... 168–175, 458–459, 629
Italy (*See also* SENN) ..... 10, 11, 33, 69, 106, 143, 341, 549

J

James Forrestal Research Center of Princeton University ..... 438
Japan ..... 126
Jarvis, Mr. Manager, Nuclear Development Division, Ford Instrument Co., statement of ..... 118–124
Johnson, Jesse ..... 405
Johnson, Dr., W. E., manager, atomic power department, Westinghouse, statement of ..... 349–359
Joint Committee on Atomic Energy ..... 177, 178, 182–183, 188–190, 547–548

K

Kaiser Engineers and ACF Industries ..... 63, 100, 101, 102, 118, 119, 140, 220, 290, 295, 376, 452–454, 511, 526, 527, 532
Statement of Kaiser Engineers ..... 452–454
Kasschaw, Kenneth, manager, nuclear power engineering, Alco Products, Inc.:
Statement of ..... 246–251
Letter from, to Chairman Anderson, March 3, 1959 ..... 251
Kellogg, Fred C., president, Pioneer Service & Engineering Co., letter from, to Chairman Anderson, February 26, 1959 ..... 460–461
Keen, John N., manager, Wolverine Electric Cooperative:
Statement of ..... 193–195
Letter from, to Chairman Anderson, February 25, 1959 ..... 209–210
King, Allen S., Northern States Power Co., letter from, to Chairman Anderson, February 4, 1959 ..... 455–456
King, Francis H., manager, city of Holyoke Gas and Electric Department, letter from, to Joint Committee on Atomic Energy, February 21, 1959 .. 451–452
Knolls Atomic Power Laboratory ..... 480
Koppers Co ..... 106
Krypton 85 ..... 274, 323–325, 326, 329–330

## L


Landrigan, Chas. R., executive vice president, Detroit Edison Co---- 442–444
Latin America. (*See* South America; *see also* Individual countries.)
Lawrooki, Dr. Stephen---- 606
Lewis, W. B., Dr---- 302
Libby, Dr. Willard---- 167
Licensing, AEC:
AEC regulations, general---- 12, 335, 346, 434
Compulsory licensing---- 482, 544
Construction permits---- 12, 287
Isotope users. (*See* Isotopes.)
Radiation hazards (*see also* Safety)---- 272, 288
Reactor licenses---- 12, 287, 346, 385, 544
Waste disposal---- 558
Linsenmeyer, John C., executive vice president, American Radiator & Standard Sanitary Corp., statement of---- 201–210
Lindseth, Elmer L., president, Cleveland Electric Illuminating Co., statement of---- 381–397
Livermore Laboratory---- 21
Lockland Aircraft Reactors Operations Office, AEC---- 6
London Mining Journal, article, January 1959---- 407
Los Angeles---- 156, 158–159
Luedecke, A. R., General Manager, Atomic Energy Commission:
Letters from, to Chairman Anderson, March 13, 1959---- 23, 86, 106–107
Letter from, to Chairman Anderson, March 6, 1959---- 228–229
Letter from, to Chairman Anderson, February 24, 1959---- 325
Letter from, to Chairman Anderson, February 1, 1959---- 485–486
Letter from, to James T. Ramey, March 17, 1959---- 598
Letter from, to James T. Ramey, March 6, 1959---- 32
Letter from, to James T. Ramey, February 2, 1959---- 228
Letter from, to James T. Ramey, March 12, 1959---- 329–330
Letter from, to James T. Ramey, March 25, 1959---- 338–340
Letter from, to James T. Ramey, May 21, 1959---- 479–480
Luntz, Jerome D., editor and associate publisher, Nucleonics Magazine, statement of---- 305–312


## M


Machinery and Allied Products Institute---- 169
Maddock E. G., Cities Service Oil Co., letter from, to Chairman Anderson, February 13, 1959---- 436–437
Mallinckrodt Chemical Works, St. Louis, Mo., statement of---- 454–455
Manpower requirements. (*See* Scientists and engineers, training and supply of.)
Maritime propulsion. (*See* Propulsion, nuclear, maritime.)
Mark III reactor core---- 67
Martin Co---- 106, 486
Marvin, Theodore, president, Michigan Chemical Corp., statement of---- 160–166
Maryland Dry Dock---- 238
Maryland Shipbuilding & Drydock Co---- 114, 115, 117
Massachusetts Institute of Technology---- 34
McCone, John A., Chairman, Atomic Energy Commission---- 146, 152, 155, 156, 158, 164, 165
Statement of---- 5–48, 54–105
McCune, Francis K., vice president, General Electric Co., statement of---- 331–348
McDonald, Angus, coordinator, division of legislative services, National Farmers Union, statement of---- 191–192
Merke, John, president, Nuclear Development Corp. of America, statement of---- 296–304
Meissner, Milton I., member of the board of directors, F. H. McGraw & Co., letter from, to James P. Ramey, February 20, 1959---- 444–446
Mexico---- 9
Michigan Chemical Corp---- 160–161, 163, 207
Mikoyan, Deputy Prime Minister, Soviet Union---- 14
Military reactors---- 3, 27, 147, 246–247, 449
Minnesota Mining & Manufacturing Corp---- 106, 486

Page
Missiles. (*See* Rockets and missiles.)
Monazite ... 425
Moore, Irwin L., New England Electric System, letter from, to Chairman Anderson, February 9, 1959 ... 455
Morehouse, E. W., vice president, General Public Utilities Corp., letter from, to Chairman Anderson, February 18, 1959 ... 447
Morris, Samuel B., American Public Power Association, statement of ... 142–143, 152–160
Mound Laboratory ... 106

N

National Coal Association ... 397, 398, 401, 403
National Industrial Conference Board ... 167
National Laboratories ... 177
National Planning Association ... 147, 254
National Reactor Testing Station ... 67, 529
National Rural-Electric Cooperative Association ... 145, 146, 252, 262–263
Resolution ... 252
National Western Mining Conference ... 377–379
*Nautilus* ... 221
New England Electric System ... 395, 455, 483–484
Northern Miner, articles, November 28, 1957 and May 15, 1958 ... 210–211
Northern States Power Co ... 57, 69, 87, 106, 393, 455–456, 492
Pathfinder project ... 69, 87, 393
Northwest Uranium Mines, Inc ... 414–416
Nuclear aircraft. (*See* Propulsion, nuclear, aircraft.)
Nuclear-maritime ships. (*See* Propulsion, nuclear, maritime.)
Nuclear-Chicago Corp ... 456–458, 629
Nuclear Develop Corp. of America ... 86
Nuclear Power Group, Inc ... 393
Nuclear superheat. (*See* Process heat.)
Nucleonics Magazine
Article, February 1958 ... 349–353
Article, March 1959 ... 540–546

O

Oak Ridge Institute of Nuclear Studies ... 175
Oak Ridge National Laboratory ... 32, 74, 220, 224, 348, 350, 357, 358, 363, 487
Oil. (*See* Fuel, conventional.)
Organization for European Economic Cooperation (OEEC) ... 11, 21, 59, 302, 343–344

P

Pacific Gas & Electric Co ... 176, 391, 393, 395
Humboldt Bay powerplant ... 87, 176, 336, 493
Palmer, Robert S., National Western Mining Conference, statement of ... 377–379
Parr, S.C ... 393
Particle accelerator sales ... 558
Patents ... 18, 27, 31, 150–151, 253–256, 287, 429–430, 434, 472–473, 482, 544, 625
Foreign patents ... 472–473, 482
Peale, Mundy I., Republic Aviation Corp., letter from, to Chairman Anderson, February 16, 1959 ... 466–467
Pennsylvania Electric Co ... 395
Pennsylvania Power & Light Co., PAR (Pennsylvania advanced reactor) ... 9, 66, 74, 76, 81, 100, 136, 187, 309, 348, 349, 359, 361, 364
Petroleum. (*See* Fuel, conventional.)
Philadelphia Electric Co ... 63, 88, 89, 100, 118, 119, 135–136, 139, 140, 176, 185, 186, 395, 511, 532
Pickett, Tom, executive vice president, National Coal Association, statement of ... 397–403
Pigford, Thomas H., assistant director, General Atomic Division, General Dynamics Corp., statement of ... 9, 125, 135–138
Pioneer Service and Engineering Co ... 460–461
Piqua, Ohio, city of, powerplant ... 61, 87, 88, 145, 150, 151, 155, 156, 157, 158, 486, 491

Page

Pittman, Dr. Frank K., Director, Division of Reactor Development, AEC, letter from, to Michigan Chemical Corp., February 6, 1959 ..... 163–164
Pittsburg Naval Reactor Operations Office, AEC ..... 6
Plowden, Sir Edwin ..... 94, 95
Plutonium ..... 2, 7, 10, 14, 16, 88, 157, 162, 286, 301, 334, 336–337, 339, 370, 399, 425, 427, 428, 437, 518, 528–529, 533, 542–543, 571, 580, 588, 592, 593–594, 595–596.
  Cost of ..... 157
  Price of ..... 162, 334, 339
Plutonium recycle reactor ..... 59–60, 74, 88, 511, 519, 520, 528, 532, 579
Porter, R. R ..... 414
Power nuclear:
  Cost of ..... 39, 98, 149–150, 187–188, 201, 240–241, 256, 275–276, 398, 400–401, 432, 444, 454–468, 482, 510, 513–516, 520, 531, 536, 541, 568, 569–597
  Instrument of foreign policy ..... 3, 146
  Need for ..... 3, 98, 187–188
  Need of foreign countries ..... 3, 146–147, 151, 152, 254, 282, 399
  State coordination of atomic energy research ..... 559
  Supply of ..... 244, 275
Power Development Associates, Inc ..... 465
Power Industry, article, January 1959 ..... 14, 401
Power reactor demonstration program:
  Adequacy of ..... 2, 41–42, 75, 77, 143, 191, 280, 283, 290, 294
  Cooperatives and public power organizations, participation in ..... 4, 46–47, 143–150, 152, 156, 263, 290, 541
  Designs for reactors approved by AEC, 1958 and 1959 ..... 104
  Federal grants and subsidies ..... 4, 18, 43, 46–48, 68–69, 75, 77, 96–97, 109, 143–145, 150, 154, 158–159, 160, 163, 179–180, 184, 198, 200, 232–235, 259–262, 281, 283, 286–287, 332, 346–347, 369, 370–371, 398, 399, 400, 401, 420, 427–428, 438, 440–441, 446, 453, 455, 456, 535, 541, 625–628.
  First round ..... 3, 40, 153, 306, 307, 421, 467, 489
  Funds authorized for program, fiscal 1959 and 1960 ..... 78–79, 103
  Power reactor projects ..... 76, 84–85, 87, 486–492, 539–540
    List of projects ..... 76, 486–492
    Reactor designs, list of ..... 539–540
  Private electric utility companies, participating in ..... 386–396, 471–472, 493
  Rural electric cooperatives, participation in ..... 145, 148–149, 150, 152, 154–155, 156, 188, 197–198, 252–253, 255, 257–259, 467, 541
  Second round ..... 3–4, 40, 42, 86, 145, 149, 150, 153, 154, 160, 189, 257, 263, 290, 306, 421, 490
  Third round ..... 149, 150, 153, 163, 189, 393, 492, 535
Power reactor development (*see also* Atomic Energy Commission, Power reactors; Power, nuclear; Power reactors):
  Acceleration of program ..... 90–91, 101, 183, 184, 240, 280, 286, 293, 310, 346, 424, 467–468
  Adequacy of program ..... 2, 9, 36–37, 38–48, 75, 82, 88, 95, 101–102, 105, 109, 143, 151, 182, 191, 253, 255, 256–257, 280, 289–290, 292, 332, 368, 375, 377, 397, 399, 485.
  Communist names of countries
  Communist countries (*see also* names of countries) ..... 191
  Costs ..... 43, 88, 91–93, 103, 106–107, 195, 399, 432, 502, 541
  Foreign program ..... 9, 10–11, 14–15, 33, 39, 48–51, 69, 82, 88–91, 95, 96, 101, 143, 146–147, 152, 191, 236, 237, 253–254, 256, 311, 510, 513, 541, 551–552, 554–555.
  U.S. reactors sold abroad, list of ..... 551–552, 554–555
  Government's role (*see also* Power reactor demonstration program, Federal grants and subsidies) ..... 12, 39, 45, 71, 144, 150, 152, 178, 284–287, 306, 381, 420, 512, 513, 534–535, 537
  Industry's role ..... 3, 4, 19, 20, 39, 42, 43, 45, 46, 74, 77, 108–109, 144–146, 148–150, 152, 178–179, 189, 240, 275, 280, 285, 332, 374–375, 381, 382, 384, 420, 435–436, 467, 512, 534
  International obligation for leadership ..... 283, 285, 305, 345, 382, 383, 399, 424, 430, 440, 452, 514–515, 537, 545
  Materials testing reactors ..... 553

Page

Power reactor development—Continued
Prototype and experimental plant construction 68–69, 96, 98, 108–109, 110–111, 190, 275, 278, 368–369, 370, 383, 522–523, 529, 534, 541
Prediction of competitive nuclear power 183, 368, 375, 399, 419, 471, 514
Small versus large plants 40, 45, 68–69, 109, 110–111, 146–148, 151, 152, 180–183, 189, 191, 194–196, 197–200, 203, 205, 226, 247–251, 254–255, 280, 283, 286, 303, 369, 370, 383, 420, 432, 446, 453, 456, 481, 512, 522–523, 529, 534, 535, 537.
Time schedule for development 177–178, 383, 420, 421, 471, 533, 546, 548
U.S. leadership 452, 471, 510, 513, 514, 537, 541
U.S. reactors, list of 549–551, 552–556
Power Reactor Development Co 67, 393, 461–466, 490
Statement of 461–466
Power reactors (*see also* Power, nuclear; Power reactor development; Power demonstration reactor program):
Cost of operating 487–493
Design and construction program of AEC, 1958–59 104
Electric companies participating 386–389
Fuel costs, large U.S. power stations 563–597
Summary 566
Powerplants in operation, list 390
Reactors, to be developed 546–548
Site hazards (*see also* Safety) 218
Types of (*see also* under names of individual reactors) 54–83
Aqueous homogeneous. (*See* aqueous homogeneous reactor.)
Boiling water. (*See* Boiling water reactor.)
Borax reactors 57, 87, 498
Breeder types 39, 64, 66–68, 74, 88, 89, 98, 176, 421, 427, 444–445, 463, 468–469, 488, 490, 496, 500–501, 510, 511, 512, 514, 519, 520, 527, 528, 533, 534.
Fluid fuel 65–66, 74, 357, 359, 377, 429, 511, 517, 518, 519, 523, 527, 530
Gas-cooled 37, 62–64, 67, 82, 88, 89, 99, 114–116, 117–118, 135, 140–141, 151, 152, 181–182, 367–368, 372–373, 420, 421, 451, 511, 526, 527, 532, 540.
Heavy water-moderated 59–60, 74, 88, 100, 111, 295, 296, 300–304, 376, 420, 421, 423, 433, 517, 524, 532.
Helium-cooled 526
Liquid metal fuel 65–66, 101, 102, 313, 525
Mercury-cooled 530
Molten bismuth 511, 519, 533
Molten salt 511, 519, 533
Natural uranium (*see also* Heavy-water moderated) 59, 300–301, 373
Organic moderated 60–62, 70, 80, 176, 181, 376, 391, 486, 489, 491, 499, 511, 517, 525, 532
Pebble-bed 527, 532
Plutonium recycle. (*See* Plutonium recycle.)
Pressure tube 108, 524, 533
Pressurized water. (*See* Pressurized water reactor.)
Process heat reactor 57, 68, 74, 421, 446–447, 453, 511, 524, 529, 552
Sodium-cooled 64–65, 70, 71–72, 74, 86, 88, 296, 301, 391, 441–442, 486, 489, 491, 500, 511, 518, 519, 525, 526, 532.
Water-cooled (*see also* Boiling-water reactor; Pressurized-water reactor 54–59, 181, 313, 517, 519, 523–524, 591, 597
Under construction or contract 392
U.S. export of 10–11
Power station, nuclear, sea transportable 449–451
Powers, Philip N., president, Inter-Nuclear Co., letter from, to Chairman Anderson, February 18, 1959 452
Pratt & Whitney 29
Pressurized water reactor 55–56, 69, 87, 91, 97, 100, 108, 119, 247, 248, 251, 276, 305, 373, 431, 483, 486, 487, 489–499, 532

Page

Process heat, nuclear ..... 68–69, 87, 160–163, 164–166, 204–205, 207, 317, 367, 369–370, 371–372, 395, 430
Propulsion, nuclear:
  Aircraft ..... 2, 29–31, 486, 552–553
  Maritime ..... 37–38, 113–124, 134–135, 138, 230–239, 333–334, 428–429, 436–437, 453, 479–480, 529, 542, 549, 552
  Railroad ..... 312–318, 319–320, 327–328
Project plowshare ..... 13, 21–22, 23–25, 27–28
Project Sherwood ..... 29–30
Public vs. private power ..... 3, 4–5, 42, 46–48, 188, 190, 191–192, 259, 306, 307, 310, 467, 544
Puerto Rico Water Resources Authority ..... 157, 158, 290, 367, 372

R

Radiation (*see also* Safety) ..... 10, 266, 273, 281–284, 288, 323–326, 329–330, 336, 399, 445–446, 486, 557
  Hazards of ..... 266, 273, 336, 399
Radioisotopes. (*See* Isotopes.)
Railroad. (*See* Propulsion, nuclear, railroad.)
Ramey, James T., executive director, Joint Committee on Atomic Energy:
  Letter from, to A. R. Luedecke, February 20, 1959 ..... 174
  Letter from, to A. R. Luedecke, February 2, 1959 ..... 228
  Letter from, to A. R. Luedecke, February 26, 1959 ..... 329
  Letter from, to A. R. Luedecke, February 27, 1959 ..... 338
  Letter from, to A. R. Luedecke, April 22, 1959 ..... 479
  Letter from, to A. R. Luedecke, January 27, 1959 ..... 485
  Letter from, to Clark L. Wilson, March 6, 1959 ..... 418
Raytheon Manufacturing Co ..... 106
Refrigeration ..... 322
Republic Aviation Corp ..... 466–467
Richfield Oil Corp ..... 21–22, 23–25
Rickover, Admiral ..... 216, 222, 223, 229
Rockets and missiles ..... 553
Rockwell, Chas. S., president, Ford Instrument Co., statement of ..... 113–124
Rocky Mountain Pacific nuclear research group of utilities ..... 137
Roe, R. C., president, Burns & Roe, Inc., letter from, to Chairman Anderson, February 16, 1959 ..... 430–432
Romney, Miles P., letter from, to Hon. Wayne N. Aspinall, April 2, 1959 ..... 214
Rowe, Mass., powerplant. (*See* Yankee Atomic Electric Co.)
Runion, T. C., general manager, Davison Chemical Co., letter from, to Chairman Anderson, Joint Committee on Atomic Energy, February 24, 1959 ..... 442
Rural Cooperative Power Association ..... 57, 87, 145, 147, 150, 151, 155, 156, 255, 467–468, 490
  Letter from, to Chairman Anderson, Februray 16, 1959 ..... 467–468
Rural Electrification Administration (REA) ..... 69, 87, 145, 149, 155, 156, 209, 210
Russia. (*See* Soviet Union.)

S

Safety (*see also* Radiation) ..... 281–282, 283–284, 288, 312, 317, 329, 399–400, 435, 479–480, 531, 544, 600
St. Louis, Mich ..... 160, 161, 163, 164
Saline water conversion ..... 68
Sanderson & Porter, statement of ..... 468–469
Santa Susana, powerplant ..... 97, 441, 488.
Savannah River, reactor ..... 74
*Savannah* ..... 37–38, 69, 119, 120, 123, 230, 231, 429
Saxton, Pa., powerplant. (*See* Westinghouse Electric Corp.)
Schacht, R. L., general manager of Consumers Public Power District, statement of ..... 441–442
Schenectady Naval Reactors, Operations Office, AEC ..... 6
Scientists and engineers ..... 456–457
SENN. (*See* Societa Elettronucleare Nazionale.)
Shaw, David F., vice president, Kaiser Engineers, letter from, to Chairman Anderson, February 16, 1959 ..... 452–454

Page
Sherwood Steering Committee. (*See* Project Sherwood.)
Shippingport Atomic Power Station ..... 43, 55–56, 69, 87, 97, 110, 203, 216–218, 220–229, 255, 391, 401, 445, 487, 497–498, 564, 565, 567, 569–571, 573, 576, 580, 582, 583, 584, 585.
Training program ..... 222, 227–228
Siberia ..... 191
Silver Buckle Mining Co. ..... 416–419
Simons, E. M. ..... 607
Simpson, John W., general manager, Bettis plant, Westinghouse Electric Corp., statement of ..... 216–228
Slurry type homogenous reactor. (*See* Aqueous homogeneous reactor.)
Smog ..... 326
SNAP. (*See* Systems for nuclear auxiliary power.)
Snyder, W. Cordes, Jr., president, Blaw-Knox Co., letter from, to George F. Murphy, Jr., U.S. Capitol Building, February 10, 1959 ..... 430
Societa Elettronucleare Nazionale (SENN) ..... 33, 106
Sodium deuterium reactor. (*See* also Power reactors, types of, sodium cooled) ..... 296, 304
Sodium-graphite reactor. (*See* also Power, reactors, types of, sodium cooled) ..... 525
South Africa ..... 2, 8, 10, 211
South America ..... 33
South Asia ..... 146
South Carolina Electric & Gas Co ..... 433
Southern California Edison Co ..... 118, 391
Southwest Atomic Energy Associates ..... 470
Soviet Union ..... 14–15, 16, 26, 48–51, 81, 88–89, 90, 95, 96, 126, 191, 254, 312–317, 372, 476, 528, 545
Spector, Dr. Norman A., vice president, Vitro Corp. of America, statement of ..... 419–425
Spencer, Kenneth A., National Coal Association, statement of ..... 398–401
Spokane Indian Reservation ..... 414, 419
Starr, Dr. Chauncey, North American Aviation, Inc ..... 70–72, 98, 426–428
Letter from, to Hon. John A. McCone, February 20, 1959 ..... 70–72
Statement of ..... 426–428
Steam plants. (*See* Process heat.)
Stone & Webster Engineering Corp. ..... 359, 365, 433, 483
Submarines, Atomic ..... 549
Sulzer Bros ..... 317
Sweden ..... 59, 207, 302
Switzerland ..... 10, 18, 21, 336, 342
Systems for Nuclear Auxiliary Power (SNAP) ..... 13, 26, 106, 486, 557–558

T

Tarasov, Nikolai ..... 191
Texas Atomic Energy Research Foundation ..... 137
Thermoelectricity ..... 26, 106, 137
Thermonuclear power ..... 7, 12–13, 27–29, 30–31, 37, 438, 558
Access to classified information ..... 7, 27, 37
Research and development ..... 12–13, 27–29, 30–31, 37, 438, 558
Thompson Products ..... 106
Thorium ..... 276–277, 348, 420–425, 442, 468, 470, 495, 510, 514, 515, 519, 541, 567, 592, 593–596
Cost of ..... 442
Reserves ..... 422, 424–426
Townsend, Stanley C., Pennsylvania Power & Light Co., article ..... 348–353
Tracerlab, Inc ..... 167–168, 172
Transient Reactor Test Facility (TREAT) ..... 67
Tybout, Prof. R. A., Ohio State University ..... 259
Turbine, nuclear ..... 317

U

Page
United Engineers & Constructors, Inc. 443
United Kingdom 8, 33, 62, 81, 88–89, 93–95, 96, 140, 143, 185, 186, 191, 210, 266, 317, 342, 345, 427, 528, 579
Power reactor development, chart 94
(*See also* Calder Hall powerplant.)
University of California 175
University of Missouri, Mid-American assembly 82
Uranium 10, 120, 281, 300–302, 304, 334, 442, 510, 514, 541, 580, 584, 585, 586, 588, 590, 591, 592–597
Leasing of 10, 37, 586
Mining operations 8, 377–379, 404–406, 436, 442, 483, 544, 558
Mills, list of 556–557
Price of 334, 442, 481, 516, 582
Uranium 233 10, 470, 519, 520, 530, 532, 580–581, 592, 596
Uranium 235 (enriched) 20, 21, 37, 39, 120, 217, 301, 328, 334, 336–337, 339, 370, 373, 437, 454–455, 468, 514–519, 530, 541, 558, 567, 571, 580–581, 586, 588–589, 592–594, 597, 627.
Uranium 238 515, 591, 592, 593
Uranium carbide 495
Uranium oxide 217–218, 219–220, 221, 222, 378, 442, 454, 495–496, 583, 585
Uranium-zirconium hydride 137
Uranium Institute of America 403–404
Utah Mining Association 214, 408

V

Vallecitos, Calif., powerplant. (*See* General Electric Co.)
Vander Weyden, Dr. A. J 163–164
Virginia Electric & Power Co 433
Vitro Engineering Co 277
Vitro Corp. of America 419–425

W

Wakefield, Ernest H., director, Radiation Counter Laboratories, Inc., letter from, to Chairman Anderson, April 1, 1959 629
Waste disposal, radioactive materials 558, 568, 400
Weaver, Charles H., vice president, Westinghouse Electric Corp 107–112
Webster, William, president, Yankee Atomic Electric Co., letter from, to Chairman Anderson, February 11, 1959 483–484
Wedin, Ivor T., president, Wedin Corp., statement of 474–480
Weinberg, Dr., Oak Ridge National Laboratory 348
Weller, Gordon A., executive vice president, Uranium Institute of America, statement of 403–408
Welsh, J. Robert, president, Southwest Atomic Energy Associates, letter from, to Joint Committee on Atomic Energy, February 18, 1959 470
West Coast Nuclear 376
West Germany. (*See* Germany, Federal Republic of.)
Westinghouse Electric Corp 9, 66, 74, 100, 107, 109, 156, 302, 391, 395, 433, 448, 474–475, 476–480, 483
Edison-Volta 11, 33
Pennsylvania advanced reactor project 66, 74, 348–349, 359–366
Materials testing reactor, Idaho 218
Saxton, Pa., powerplant 395, 447–449
Winterbottom, John J., vice president, Esso Standard Oil Co., statement of 229–239
W. H. Johnson Laboratories 34
Wheaton, G. S., vice president, American Potash & Chemical Corp., letter from, to Chairman Anderson, February 18, 1959 425–426
Wilson, Carroll L., letter from, to Chairman Anderson, February 27, 1959 480–482

Page
Wilson, Clark L., vice president, Silver Buckle Mining Co., statement--- 413–419
Letter to, from James T. Ramey, March 6, 1959---------- 418
Letter from, to Jesse C. Johnson, Atomic Energy Commission--------- 419
World Bank. (*See* International Bank for Reconstruction and Redevelopment.)
Wolverine Electric Cooperative---------- 76, 145, 194, 202–203, 206, 209–210, 257
Wyoming Mining Association---------- 483

Y

Yankee Atomic Electric Co---------- 55, 56, 87, 119, 393, 455, 483–484, 489–490, 564, 565, 567, 569–570, 573, 582, 591.

Z

Zinn, Dr. Walter H---------- 15, 48–51, 191, 254, 366–377, 605
Letter from, to Joint Committee on Atomic Energy, October 21, 1958-- 48–51
Statement ---------- 366–377
Zirconium ---------- 221, 225, 240, 517, 520, 558, 583, 584, 585, 593, 594, 626
Production ---------- 558
Zircaloy---------- 221, 496, 591

○